

What Is Claimed Is:

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1. Apparatus for providing retrograde transvenous myocardial perfusion, the apparatus comprising:

an inlet conduit configured to be inserted into a source of oxygenated blood, the inlet conduit having an inlet end, an outlet end and a lumen extending between the inlet end and the outlet end;

an outlet conduit having an inlet end, an outlet end and a lumen extending between the inlet end and the outlet end, the outlet end configured to be inserted into a patient's coronary venous vasculature;

a coupler for coupling the outlet end of the inlet conduit to the inlet end of the outlet conduit so that blood flows from the source of oxygenated blood into the patient's coronary venous vasculature.

2. The apparatus of claim 1 wherein the coupler is disposed on one of the inlet conduit and the outlet conduit.

3. The apparatus of claim 1 wherein the inlet conduit is integrally formed with the outlet conduit and the coupler comprises a length of conduit disposed between the inlet conduit and outlet conduit.

4. The apparatus of claim 3 wherein the one of the inlet conduit and the outlet conduit includes a through-wall hole and a hemostatic sleeve disposed for slidably covering the through-wall hole.

5. The apparatus of claim 4 further comprising a hemostatic port disposed for slidably

covering the through-wall hole, the hemostatic port including first and second hemostatic clamps and a coupling.

~~5.~~ The apparatus of claim 1 further comprising a stylet having a distal end configured to engage the inlet conduit when the stylet is inserted into the lumen of the inlet conduit, the stylet providing rigidity to the first conduit to assist in placement of the inlet end of the inlet conduit.

~~6.~~ The apparatus of claim 6 wherein the lumen of the inlet conduit further comprises a portion defining a shoulder adjacent the inlet end, and the distal end of the stylet is configured to abut against the shoulder when the stylet is inserted into the lumen of the inlet conduit.

~~7.~~ The apparatus of claim 6 wherein the inlet end of the inlet conduit has a lateral opening communicating with the lumen of the inlet conduit, and the stylet isolates the lateral opening from communicating with the lumen of the inlet conduit when the stylet is inserted into the lumen of the inlet conduit.

~~8.~~ The apparatus of claim 6 wherein the stylet includes a lumen, the apparatus further comprising a guidewire disposed within lumen of the stylet to assist in guiding the inlet end of the inlet conduit.

~~10.~~ The apparatus of claim 9 wherein the guidewire is movable between a first position, wherein a distal end of the guidewire is retracted within the lumen of the stylet, and a second position, wherein the distal end of the guidewire is extended beyond an end of the inlet conduit.

~~11.~~ The apparatus of claim 6 wherein the stylet includes a lumen, the apparatus further comprising a cannula disposed within lumen of the stylet, the cannula movable between a first position, wherein a sharpened distal end of the cannula extends beyond an end of the inlet conduit, and a second position, wherein the sharpened distal end is retracted within the lumen of the stylet.

~~12.~~ The apparatus of claim 11 wherein the cannula includes a lumen, the apparatus further comprising a guidewire disposed within lumen of the cannula to assist in guiding the inlet end of the inlet conduit.

~~13.~~ The apparatus of claim 12 wherein the guidewire is movable between a first position, wherein a distal end of the guidewire is retracted within the lumen of the cannula, and a second position, wherein the distal end of the guidewire is extended beyond an end of the inlet conduit.

~~14.~~ The apparatus of claim 13 further comprising means for moving the cannula between the first and second positions, and for moving the guidewire between the first and second positions.

~~15.~~ The apparatus of claim 13 wherein the cannula has a portion defining an elongated skive and the guidewire enters the lumen of the cannula via the elongated skive.

✓ ~~16.~~ The apparatus of claim 1 further comprising:

a sensor coupled in fluid communication to one of the inlet and outlet conduits for monitoring a flow-related parameter.

~~17.~~ The apparatus of claim 1 wherein the outlet end of the outlet conduit further comprises retaining means that engage an interior wall of a portion of the coronary venous vasculature.

1 ~~18.~~ The apparatus of claim 1 wherein the outlet conduit further comprises a valve disposed adjacent to the outlet end.

~~19.~~ The apparatus of claim 1 wherein the valve comprises:

a plurality of through-wall elongated slits circumferentially spaced-apart around the outlet conduit; and

a cage affixed to the outlet conduit in registration with the elongated slits.

20. The apparatus of claim 1 further comprising:

a drug infusion device coupled in fluid communication to the inlet and outlet conduits, the drug infusion device infusing a predetermined amount of

a therapeutic agent into blood flowing into the patient's coronary venous vasculature via the outlet conduit.

21. The apparatus of claim 20 further comprising:

means for infusing a predetermined amount of a cooled saline into the volume of blood flowing into the patient's coronary venous vasculature via the outlet conduit.

22. The apparatus of claim 1 further comprising:

means coupled in fluid communication to the inlet and outlet conduits for monitoring a flow-related parameter for blood flowing into the patient's coronary venous vasculature via the outlet conduit.

23. The apparatus of claim 1 further comprising:

a chamber coupled between the outlet end of the inlet conduit and the inlet end of the outlet conduit, the chamber having a volume sufficient to accumulate blood over several cardiac cycles.

24. The apparatus of claim 23 further comprising:

a drug infusion device coupled to the chamber, the drug infusion device infusing a predetermined amount of a therapeutic agent into blood accumulated in the chamber.

25. The apparatus of claim 1 further comprising a pump coupled between the outlet end of the inlet conduit and the inlet end of the outlet conduit.

~~26.~~ The apparatus of claim 25 further comprising:

a chamber coupled between the outlet end of the inlet conduit and the inlet end of the outlet conduit, the chamber having a volume sufficient to accumulate blood over several cardiac cycles.

27. The apparatus of claim 26 further comprising:

a drug infusion device coupled to the chamber, the drug infusion device infusing a predetermined amount of a therapeutic agent into blood accumulated in the chamber.

~~28.~~ The apparatus of claim 25 wherein the pump is motor-driven, the apparatus further comprising control circuitry for actuating the pump responsive to user selected input.

~~29.~~ The apparatus of claim 28 wherein the control circuitry controls activation of the pump to limit a parameter related to a pressure attained within the coronary venous vasculature to a value less than a predetermined value.

~~30.~~ The apparatus of claim 29 wherein the control circuitry is programmed by the user selected input to activate the pump with a predetermined duty cycle.

31. The apparatus of claim 28 wherein the pump comprises a mechanism having a first state wherein the mechanism stores hydraulic energy transmitted by blood entering the chamber and a second state wherein the mechanism periodically releases the stored energy to pump blood into the outlet conduit.

32. The apparatus of claim 31 further comprising:

a drug infusion device coupled to the chamber, the drug infusion device infusing a predetermined amount of a therapeutic agent into blood accumulated in the chamber.

~~33.~~ The apparatus of claim 1 wherein the outlet end of the outlet conduit includes a plug that partially or fully occludes the coronary ostium.

34. The apparatus of claim 1 wherein the inlet conduit is configured to be placed in a source of oxygenated blood selected from the group consisting of: the left atrium, left ventricle, aorta, pulmonary vein, subclavian artery, brachiocephalic artery, radial artery or femoral artery.

35. The apparatus of claim 1 wherein the inlet end of the inlet conduit comprises a portion defining a plurality of lateral openings that communicate with the lumen of the inlet conduit.

~~36.~~ The apparatus of claim 1 further comprising a radio-opaque marker band disposed on one of the inlet conduit and the outlet conduit.